identifying the message by comparing the received signal with the generated minimum and maximum thresholds.

47. A method of identifying a message based upon a received signal, the method comprising the steps of:

receiving the signal;

providing a minimum threshold and a maximum threshold representing a range for each of a plurality of possible message levels, wherein the maximum threshold for a possible message level (i) is separated from the minimum threshold for a possible message level (i+1) by a distance d(i); and

identifying the message by comparing the received signal with the minimum and maximum thresholds.

48. The method of claim 47, wherein the sizes of the ranges are different for at least two of the message levels.

49. The method of claim 47, wherein the distances d(i) are different for at least two different pairs of message levels.

50. The method of claim 47, further comprising the step of generating the minimum and maximum thresholds using transmitted training signals.

REMARKS/ARGUMENTS

Claims 1-50 are pending in the application. Claims 1, 10, 19-21, 25, 32, and 36 are amended; and new claims 37-50 are added herein. The Applicant hereby requests further examination and reconsideration of the application in view of the foregoing amendments and these remarks.

Objections to Drawings

In paragraph 1 of the office action, the Examiner objected to the drawings. In response, the Applicant submits herewith a Transmittal of Corrected Drawings amending Figs. 9 and 10 as suggested by the Examiner. In addition, the Applicant has further amended the drawings to correct miscellaneous typographical errors.

Objections to Specification

In paragraph 2 of the office action, the Examiner objected to the specification for incorrectly referring to the drawings. In response, the Applicant has amended the specification as suggested by the Examiner. In addition, the Applicant has further amended the specification to correct miscellaneous typographical and grammatical errors.

Rejections Under 35 U.S.C. § 112, Second Paragraph

In paragraph 4, the Examiner rejected claims 19 and 36 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to explain the symbols "α" and "x". In response, the Applicant amended claims 19 and 36 to add an explanation of those symbols. The Applicant submits therefore that the rejections of claims under § 112, second paragraph, have been overcome.

Prior Art Rejections

In paragraph 6, the Examiner rejected claims 1, 20, and 21 under 35 U.S.C. § 102(e) as being anticipated by Manohar. In paragraph 7, the Examiner rejected claims 10 and 13 under 35 U.S.C. § 102(e) as being anticipated by Okunev. In paragraph 9, the Examiner rejected claims 9 and 28 under 35 U.S.C. § 103(a) as being unpatentable over Manohar in view of Okunev.

In paragraph 10, the Examiner objected to claims 2-8, 11, 12, 14-18, 22-27, and 29-35 as being dependent upon a rejected base claim, but indicated that the claims would be allowable if rewritten in independent form.

Claims 1, 20, and 21

According to claims 1, 20, and 21, there is a minimum threshold and a maximum threshold representing a range for each of a plurality of possible message (or signal) levels. Claims 1, 20, and 21 have been amended to emphasize that the size of the range corresponding to each possible level can vary from level to level. In particular, claims 1 and 21 have been amended to recite that "the sizes of the ranges are different for at least two of the message levels." Similarly, claim 20 has been amended to recite "the minimum and maximum thresholds for each possible signal level representing a range that may differ between possible signal levels."

The Examiner rejected independent claims 1, 20, and 21 citing column 3, lines 14-17, and Fig. 4 of Manohar. The Applicant submits that Manohar does not teach or even suggest the combinations of features recited in once-amended claims 1, 20, and 21, either in the cited passage and figure or anywhere else in the reference. Fig. 4 shows a receiver that compares a received signal to two voltage references. See, e.g., column 3, lines 9-10.

At best, the two voltage references would be equivalent to a single minimum threshold and a single maximum threshold corresponding to a single signal level of the present invention. However, according to the invention of claims 1, 20, and 21, there are a plurality of message/signal levels, each with its own pair of minimum and maximum thresholds.

Thus, Manohar does not teach or even suggest the invention of claims 1, 20, and 21. As such, the Applicant submits that claims 1, 20, and 21 are allowable over Manohar. Since claims 2-9 and 22-36 depend variously from claims 1 and 21, the Applicant submits further that those claims are also allowable over Manohar.

Claim 10

According to claim 10, a constellation design for a receiver is formed by determining a minimum threshold and a maximum threshold representing a range for each of a plurality of possible signal levels. Claim 10 has been amended to clarify that the distance d(i) is calculated between the maximum threshold for possible signal level (i) and the minimum threshold for possible signal level (i+1). In other words, the distance d(i) represents the difference between the maximum threshold for one possible signal level (i) and the minimum threshold for the next possible signal level (i+1).

The Examiner rejected claim 10 citing column 3, lines 17-20 of Okunev. While it is true that Okunev teaches a method for forming a constellation design for a receiver, there is no teaching or even suggestion in Okunev that there is a distance between a maximum threshold for one signal level and a minimum threshold for the next signal level. The "upper and lower bounds" described in the passage

cited by the Examiner are not minimum and maximum thresholds assigned to each different signal level. Rather, the upper and lower bounds relate to the distances between adjacent signal levels in the constellation of Okunev.

An example may help illustrate the differences between these two concepts. Assume, for example, an embodiment of the present invention in which a first signal level having a value of 10 units has a minimum threshold of 6 units and a maximum threshold of 14 units. Assume further a second signal level having a value of 20 units with a minimum threshold of 18 units and a maximum threshold of 22 units, and a third signal level having a value of 30 units with a minimum threshold of 24 units and a maximum threshold of 36 units.

The present invention refers to the distance between the maximum threshold of one signal level and the minimum threshold of the next signal level. Thus, the distance between the maximum threshold (14 units) of the first signal level and the minimum threshold (18 units) of the second signals level is 4 units, while the distance between the maximum threshold (22 units) of the second signal level and the minimum threshold (24 units) of the third signal level is 2 units.

Okunev, on the other hand, deals only with the distances between signals levels; there is no teachings related to minimum and maximum thresholds assigned to each signal level. Thus, applying the teachings of Okunev to the same example, the distance between the first and second signal levels and between the second and third signal levels is 10 units.

In Okunev, the upper and lower bounds are applied while designing the constellation to determine whether the distance between adjacent signals levels is acceptable. If the distance is too small (i.e., less than the lower bound) or if the distance is too big (i.e., greater than the upper bound), then those signal levels are rejected for the constellation. See, e.g., column 11, lines 8-29.

This concept of upper and lower bounds in Okunev is very different from the present invention where each signal level of the final constellation has its own minimum and maximum thresholds that are then used to identify messages in received signals.

The Applicant submits therefore that claim 10 is allowable over Okunev. Since claims 11-19 depend variously from claim 10, it is further submitted that those claims are also allowable over Okunev.

In view of the foregoing, the Applicant submits that the rejections of claims under §§ 102 and 103 have been overcome.

New Claims 37-46

New claims 37-46 are equivalent to previously pending claims 2, 5, 11, 14, 15, 22, 25, 29, 30, and 32, respectively, rewritten in independent form. Since the Examiner stated that claims 2, 5, 11, 14, 15, 22, 25, 29, 30, and 32 would be allowable if rewritten in independent form, the Applicant submits that new claims 37-46 are allowable.

New Claims 47-50

According to new claim 47, a message is identified by comparing a received signal with minimum and maximum thresholds, where a minimum threshold and a maximum threshold represent a range for each of a plurality of possible message levels, and the maximum threshold for a possible

message level (i) is separated from the minimum threshold for a possible message level (i+1) by a distance d(i).

For the same reasons described in the context of claim 10, the Applicant submits that claim 47 is allowable. Since claims 48-50 depend variously from claim 47, it is further submitted that those claims are also allowable.

Attached hereto is a clean version of the changes made to the specification and claims by the current amendment, beginning with the caption "Clean version with changes incorporated."

In view of the above amendments and remarks, the Applicant believes that the pending claims are in condition for allowance. Therefore, the Applicant believes that the entire application is now in condition for allowance, and early and favorable action is respectfully solicited.

Respectfully submitted,

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